

Farm size and economic viability

"Starting from scratch, there is no way to pay all the bills and get a living wage on a typical 200-acre crop farm... Would the location lend itself to something else, like a truck farm, or a bed and breakfast on a "working" farm, etc.? Or can you get a town job and consider the farm your hobby? That is how most family farms are going nowadays...."

--Advice given on Farms.com chat thread from Paul to Tom regarding Tom's intention to set up a viable farm on 200 acres in central Missouri

Research Approach

County staff was asked to research and try to determine the minimum farm size needed to maintain economic viability in Loudoun County. The ultimate goal is to form the basis for county decisions on rezoning of agricultural areas in order to support farming in Loudoun.

This research issue raised numerous questions such as:

What determines economic viability? Is it a certain income level threshold? Is viability determined by economic self-sufficiency? Or can farm viability be based on part-time labor?

In addition to concerns related to definitions of farm viability, minimum farm size is greatly affected by type of crop or farm production as well as local economic conditions, soil types, management practices, growing conditions, etc. How do these elements factor into a minimum farm size?

Unfortunately, the answer to farm size and economic viability is not immediately apparent. Only one source, a study from Queensland, Australia, had figures related to this issue. However its utility for Loudoun is questionable. Given this, I examined other approaches to the underlying issue of farm size in the county. My research focused on four ways to determine a minimum farm size:

1. Direct research on the farm size needed to maintain economic viability
2. Use of median farm size within the county
3. Use of a farm sales threshold to compare to current farm size within the county
4. Comparison of minimum lot size of agricultural zones in other jurisdictions

My research is based on a comprehensive Internet search, phone calls and interviews, conversations with other county staff and their research, use of several USDA surveys and research materials, and a limited literature review.

The Research Results

The Question of Farm Viability

The U.S. Department of Agriculture defines a farm as any agricultural operations with at least \$1,000 in gross sales. Small farms are those with gross sales less than \$250,000. About 94 percent of the nation's farms are small; three-fourths are very small, with sales under \$50,000.

The National Commission on Small Farms acknowledged that small farms vary by region and commodity. Further,

"While \$250,000 in gross receipts may not sound small, and in fact may be high for some commodities, in other areas, it is barely sufficient to provide a net farm income comparable to the income of the average non-farmer and farms up to that size are among those whose survival is most endangered. For example, the average farm with annual gross sales between \$50,000 and \$250,000 has a net cash income of only \$23,159. Over 80 percent of a farmer's gross sales are absorbed by farming expenses.

Still, this description of small farms includes approximately 94 percent of all U.S. farms. These farms own 75 percent of the total productive assets in agriculture, mostly land, and receive 41 percent of all agricultural receipts. This description includes 41 percent of all farmers who consider farming their primary occupation and an equal percentage of farmers work part-time on the farm and rely on non-farm jobs as their primary source of income. Most of the farm units usually are referred to as "family farms."

According to Tom Daniels and Deborah Bowers, farms need to be a certain size to function efficiently. But there is debate within the agricultural community as to what efficiency means and whether larger farms truly are more efficient. Professor Willis L. Peterson from the University of Minnesota asserts "that small family and part-time farms are at least as efficient as larger commercial operations. In fact, there is evidence of diseconomies of scale as farm size increases." And viability and efficiency do not necessarily correlate.

Viability for a farm can be measured in numerous ways. Lou Nichols of the economic development department defines agriculture "sustainability" as the return on investment needed to continue past one crop or for the landowner to expect adequate financial reward. Australia's Queensland state calls this concept "living area," which it defines as "the area of land necessary for a pastoralist to derive an adequate standard of living for a family." And Michael Duffy, professor of economics at Iowa State University, cited viability as the net income needed for a small farm to survive. Finally, the USDA, within its Agricultural Resource Management Study, outlined several measures of success. These include:

- Operation provides adequate income without having to work off farm
- Operation provides a rural lifestyle
- Operation would be able to survive adverse market or weather conditions
- Gross sales are increasing
- Equity or assets are increasing
- Acres operated is increasing
- Operation can be passed to the next generation

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However, the majority of farm operator households do not make enough farm income to rely on it alone for a comfortable living (USDA, Economic Research Service, 1993). According to Ron Green, planning and research senior manager of *Hay and Forage Grower* magazine, only about one-half of the nation's farmers are self-sufficient; the other half farm part-time and rely on other income to supplement their farm income. USDA figures suggest that the number of self-sufficient farmers is even lower.

Only about 3.1 percent of all farm operator households have a farm income that alone was about equal to the average U.S. total household income (defined as \$35,000 to \$49,999). Most farms rely on off-farm income, at least in part. Research by Nebraska's Institute of Agriculture and Natural Resources indicates that average farm size is smaller in areas where local off-farm jobs are available. Where jobs are available, many farmers work full or part-time off the farm even as they keep their farms.

Thus, for the question at hand—the need to determine economic viability—I believe that a threshold farm income or sales would be required. This threshold might not meet the complete farmer income but would provide a part of it.

Threshold Levels

Daniels and Bowers use a threshold of \$40,000 in annual sales to determine true commercial operations. That threshold represents less than one-third of the country's farms but greater than four-fifths of the nation's farm products. In Queensland farm viability was defined as the farm output required to cover all variable and fixed costs (including depreciation), provide a pretax wage for the owner-operator (set at Australian \$35,000) and achieve a return on total farm capital of 6 percent. Loudoun's threshold level (to evaluate economic viability) may vary from these figures based on local farming practices and economic conditions.

A 1998 report, *A Time to Act*, prepared by the USDA's National Commission on Small Farms states:

"USDA Economic Research Service labels three-fourths of the nation's farms that have annual gross sales under \$50,000 as "non-commercial" farms, meaning they do not generate enough sales to be commercially viable on their own. Half of these farmers rely on off-farm income. Many dismiss these farmers as "hobby farmers," implying that their goals do not include making a profit. This categorization fails to recognize that for some of these farmers, off-farm jobs are not a choice, but a necessity due to the inability to obtain an adequate return from farming."

1. Farm size and viability

In my research, I could find only two studies that deal with farm size and viability. The first, done by Lou Nichols, is based on interviews of local and other crop producers and on data compiled on the range of parcel sizes optimal for production of horticultural crops. Table 9 (attached) from an 8/17/00 draft white paper on the rural economy shows minimum farm size of 3.00-9.75 acres for horticultural crops of wine grapes, Christmas trees, small fruit, market vegetables, nursery trees, and greenhouse goods. This includes acreage allowances for a house, farm operations, and crop rotation. Further, the report cites a minimum commercial size of 3.0-38.5 acres depending on the crop grown.

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Queensland, Australia conducted the only study that directly addressed the connection between farm size and economic viability. Queensland specifically acknowledged that these guidelines were designed to assist local governments in framing subdivision policy that will maintain the productive capacity of agricultural land, will avoid further fragmentation of it, and will reduce the encroachment of non-agricultural uses. The guidelines were also noted to be of value to local producers in making farm business decisions.

The Queensland study analyzed local farming systems in four specific agricultural districts (data from three districts shown) and came up with the following recommended minimum farm size:

Industry and region	Minimum farm size recommended	Major crops (by area)
Vegetable Industry (Lockyer/Fassifern Valleys)	60-80 ha (148-198 acres)	Lucerne (alfalfa) pastures for hay, grain, potatoes, pumpkins, carrots, beetroot, onions, French and runner beans, lettuce, watermelons, green peas, sweet corn, tomatoes, cabbages
Horticultural Crops (North Queensland)	15-60 ha (37-148 acres)	Vegetable and cucurbit (squash, pumpkin, cucumbers) crops, mangoes, bananas, tobacco, avocado, and mixed
Fruit Growing Industry (Granite Belt District, Shire of Stanthorpe)	16-28 ha (40-69 acres)	Apples, stone fruit, table grapes, wine grapes, and mixed

Given the differences between Australian crops, land and farming practices and those in Loudoun, I would hesitate to use these figures as an exact corollary. Thus, because the lack of good data, I looked to other approaches.

2. Median farm size

Daniels and Bowers recommend that the farm size be only slightly smaller than the average farm size in the township or county. The intention of such a policy is to help prevent the subdivision of commercial farms into hobby farms in the agricultural zone. The researchers acknowledge that the smaller the farm size allowed, the higher the price of farmland is likely to become because of competition from hobby farmers and "urban refugees."

Loudoun County's average farm is 179 acres in size. However, extreme outliers can skew an average. So, a couple of very large farms can pull the average farm size beyond the size of most of the farms. Therefore, the median, which illustrates the mid-point, may provide a better picture of farm size and viability. Below is a chart taken from USDA Agricultural Census Data (1997) that shows a comparison of several Virginia counties and their average and median farm sizes. Note that Loudoun County's median farm is 42 acres in size. That means that half of the county's farms are larger than 42 acres, while the remainder are smaller. Therefore, if Loudoun shifts to an agricultural zone with a minimum lot size below the median, the majority of all operations would exceed this.

	Average	Median
Clarke	220	99
Fauquier	250	85
Hanover	196	67
Henrico	171	50
James City	153	53
Loudoun	179	42
Mathews	145	52
Prince William	138	51
Spotsylvania	190	87
Stafford	126	57

3. Farm sales or income threshold and farm size

Another way to determine farm size and viability is through a "back door." County staff could determine a threshold figure for farm sales or net farm income. The threshold would meet a minimum agricultural viability which staff could use to determine the acreage of farms that correspond to the standard.

According to the USDA, 93 percent of Virginia's farms are larger than 9 acres. One-quarter are between 10 to 49 acres in size. Forty percent of the state's farms report gross farm sales of greater than \$10,000. Of these, 95 percent are on farms of greater than ten acres in size. Virginia farms of greater than ten acres also account for 92.7% of total net cash return from agricultural sales. Loudoun could use farm sales or income to calculate similar measures for a farm's size that meet such a revenue threshold. Economic development has such data.

4. Use of minimum lot size by different jurisdictions to support agricultural zones

Finally, Loudoun County could look to other jurisdictional approaches to minimum lot size for agricultural zones.

Attached is a chart, taken from *Holding Our Ground: Protecting America's Farms and Farmland*, showing a sample of county agricultural zones using minimum lot sizes. In addition, the following chart shows similar data from select Virginia counties.

County	Minimum Lot Size for Agricultural Zone
Prince William County	1 to 10 acres
Fauquier County	1 to 10 acres (w/ sliding scale)
Clarke County	1 to 1 acre
Isle of Wight	1 to 20 acres
Prince William	1 to 10 acres
Stafford	1 to 3 acres
Albemarle	1 to 20 acres

Summer squash	18000	0.15	2700	320	2380
Tomato	15000	0.2	3000	635	2365
Watermelon	14000	0.08	1120	384	736
Sweet corn	1,200 dozen	0.75 dozen	900	330	570
Note: Indirect costs (such as mortgage payments and expenses for equipment and marketing) have not been deducted from the returns per acre in this and other crop tables.					

Sustainable Enterprise

Many crops can be grown on small sites but to be sustainable, that is for the return on investment to continue past one crop or for the landowner to have the expectation of adequate financial reward, farm size is important. *Table 9. Range of Parcel Size Optimal for Production of Horticultural Crops* reflects the amount of land needed for entry into niche crop production, sustainability and practical limits of production.

Table 9. Range of Parcel Sizes Optimal for Production of Horticultural Crops⁵

	Christmas trees	Vineyard	Small Fruit	Market Vegetables	Tree Nursery	Greenhouses
Min planting/yr	1 ac	5 ac	1 ac	1 ac	1 ac/yr	.25 ac
rotation time	7 years				5 yr	
allowance for rotation	7 ac				5 ac	
allowance for house	1 ac	1 ac	1 ac	1 ac	1 ac	1 ac
allowance for operations	1.75	1.25	1 ac	1 ac	1.25	0.5
25%						
Min acreage	9.75	7.25	3 ac	3 ac	7.25	3 ac
Sustainable planting/yr or	3 ac/yr	30 ac	15 ac	10 ac	3 ac/yr	1 ac
total						
rotation time	7 years				5 yr	
allowance for rotation	21 ac			10 ac	15 ac	
allowance for house	1 ac	1 ac	1 ac	1 ac	1 ac	1 ac
allowance for opns 25%	5.25	7.5	3.75	5	3.75	1 ac
Commercial size	27.25	38.5	19.75	26	19.75	3 ac +
Practical upper limits of	75	100	50	50	100	10 ac
production						

⁵ A farm operation size listed comes from interviews with crop producers.

TABLE 7-1
Sample of County
Agricultural Zones
Using Minimum Lot
Sizes

County	Minimum Lot Size in Acres on Which to Build a Dwelling		Main Type of Farming
Fresno, California	1 to	40	fruits, vegetables
Madera, California	1 to	640	cattle
Marin, California	1 to	60	dairy, cattle, sheep
Napa, California	1 to	40	grapes, wine
	1 to	160	hillside vineyards
Santa Barbara, California	1 to	40	fruits, vegetables
	1 to	100	cattle
Weld, Colorado	1 to	160	cattle
Ada, Idaho	1 to	80	cattle
DeKalb, Illinois	1 to	40	cattle, grains
McHenry, Illinois	1 to	40	grains, dairy, hogs
Black Hawk, Iowa	1 to	40	grains, hogs
Story, Iowa	1 to	40	grains, hogs
Woodford, Kentucky	1 to	30	horses
Baltimore, Maryland	1 to	50	horses, grains
Rock, Minnesota	1 to	80	cattle, grains, hogs
Waseca, Minnesota	1 to	160	grains, hogs
Deschutes, Oregon	1 to	320	cattle
Marion, Oregon	1 to	40	vegetables, grass
Utah, Utah	1 to	40	cattle
Skagit, Washington	1 to	40	dairy, nursery
Dane, Wisconsin	1 to	35	dairy

Source: Compiled by authors, and 1992 Census of Agriculture.

Lands within the Agricultural District are used for commercial agricultural production. Owners, residents, and other users of this property may be subjected to inconvenience, discomfort, and the possibility of injury to property and health arising from normal and accepted agricultural practices and operations, including, but not limited to, noise, odors, dust, the operation of machinery of any kind, including aircraft, the storage and disposal of manure, the application of fertilizers, herbicides, and pesticides. Owners, residents, and users of this property should be prepared to accept these conditions and are hereby put on official notice that the Right-to-Farm Law of the State of _____ may bar them from obtaining a legal judgment against such normal agricultural operations.

Drafting the Agricultural Zoning Ordinance

The planning commission is responsible for drafting the agricultural zoning ordinance. Because the agricultural zoning ordinance has legal effect, people trained in planning or law should draft or review the ordinance. The planning commission may want to hire a consultant to work with landowners and the commission. The planning commission may want to obtain agricultural zoning

Tom Daniels + Deborah Bowers. Holding Our Ground.

